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BC Transit

SkyTrain Performance

February 1992

SKYTRAIN PERFORMANCE

SkyTrain, the Lower Mainland's automated rapid transit system, is proving to be one of the highest performing rail transit systems in North America.

- SkyTrain ridership has risen dramatically — 58 per cent in four years. Growth continues as riders are attracted by the fast, frequent service.
- SkyTrain's passenger-carrying capacity can be expanded to four times what it is today — from the equivalent capacity of a six-lane freeway to that of a 24-lane freeway — without pollution, congestion or parking problems.
- SkyTrain's schedule speed is 60 per cent higher than the average of seven new light rail systems. This high speed, together with frequent service, is a major factor in attracting riders — and development.
- SkyTrain's vehicle and staff productivity ratings are among the highest in North American rapid transit and light rail systems.
- SkyTrain is one of the two most energy-efficient rail transit systems in North America, using only one tenth the energy per passenger-kilometre of an automobile.
- As a result of its high vehicle and staff productivity and low energy consumption, the SkyTrain system's operating costs are among the lowest of North American rapid transit and light rail systems. The direct operating cost per SkyTrain passenger is one third the cost of moving that passenger by bus.
- SkyTrain is one of the quietest rapid transit systems in North America.

SKYTRAIN'S BACKGROUND

SkyTrain started service in January 1986, and carried 100 million riders in its first four years of service. Today, it carries more than 110,000 riders each day. Its 25- kilometre route links downtown Vancouver, east Vancouver, Burnaby, New Westminster and Surrey with connecting buses to Coquitlam, Port Coquitlam, Port Moody, Delta, White Rock, Langley and, via SeaBus, North Vancouver.

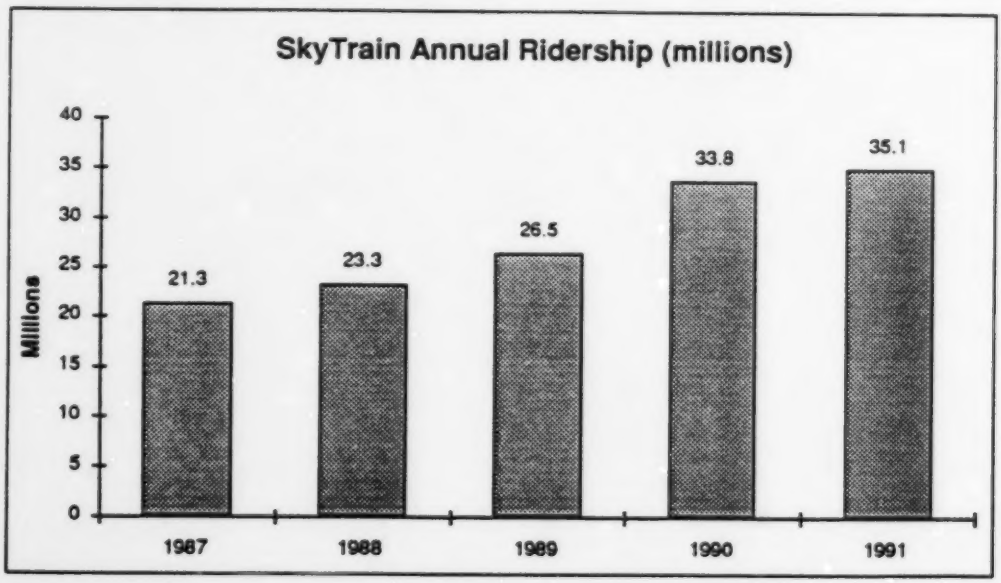
Since its inception, SkyTrain has been the backbone of an integrated, fully accessible, multi-mode transit system serving British Columbia's Lower Mainland. SkyTrain has acted as an important catalyst. Developments built or announced along the SkyTrain corridor exceed $7 billion in value. Developments adjacent to SkyTrain encourage transit use, cutting road and parking requirements, reducing pollution and congestion, and increasing mobility and job opportunities.

RIDERSHIP AND CAPACITY

SkyTrain ridership has shown steady growth, increasing 58 per cent over the last four years, including a dramatic 27 per cent increase last year after the extension to Scott Road Station opened. One sixth of all transit passengers in the Vancouver region now use SkyTrain for all or part of their trip each day.

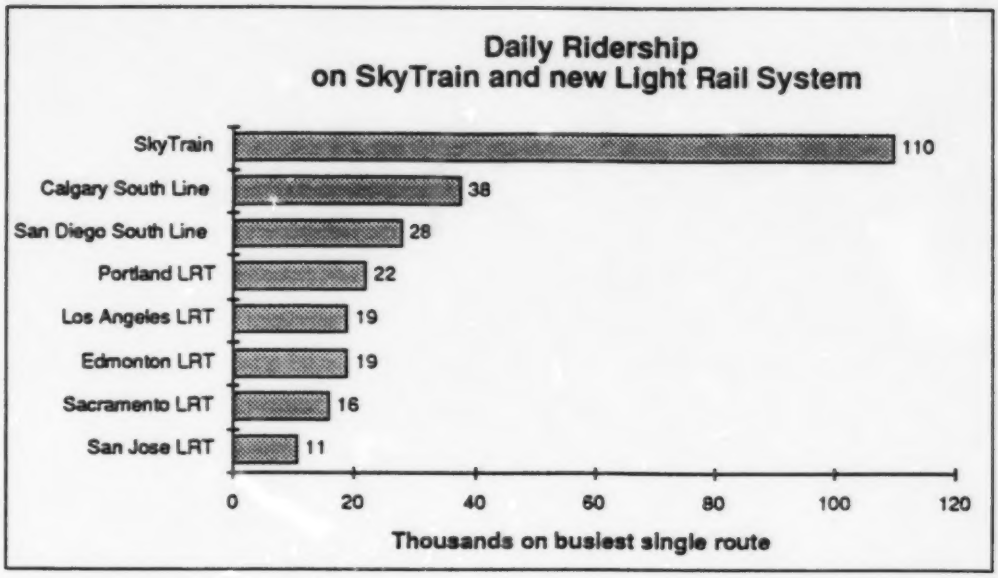
Forty per cent of all commuters to downtown Vancouver use transit to get to and from work. Three quarters of these downtown trips are by electrically powered, environmentally clean SkyTrain, or trolley buses.

The 35 million passengers SkyTrain carries annually use the system at a rate of 110,000 trips per day, making SkyTrain the most heavily used of any rail transit system opened in North America in the last decade.

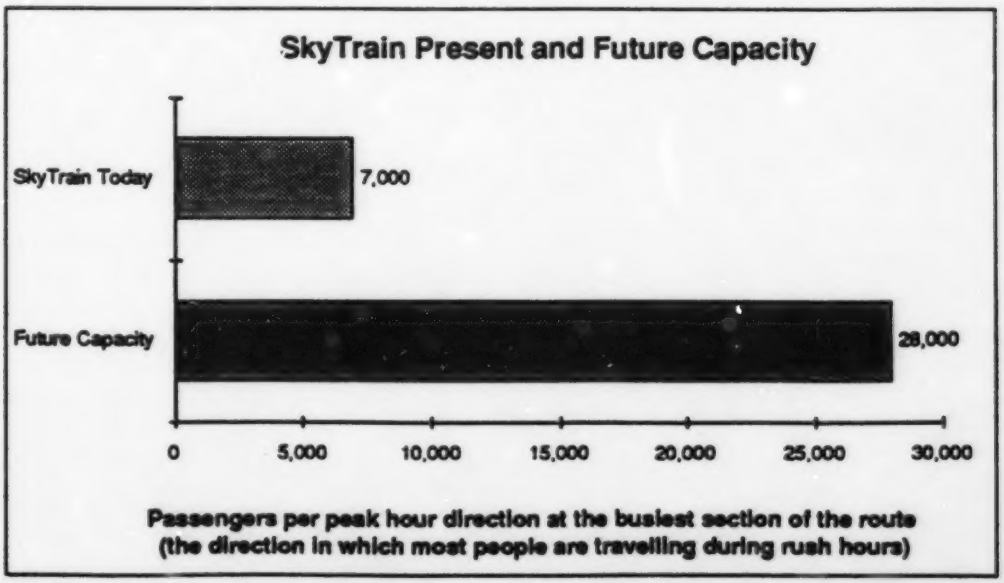


In one direction, during the busiest hour, SkyTrain carries 7,000 passengers over the highest use section between Broadway and Main Street stations. SkyTrain has been designed to handle future growth with ease — by adding cars and increasing the capacity of the automatic train control system and the power supply system. In the future, longer trains of the more spacious Mark II cars will each comfortably carry 700 passengers. These trains use the full length of station platforms. At headways of one-and-a-half minutes, 40 trains can be operated each hour in each direction, providing an hourly capacity of 28,000 passengers, exactly four times the present peak-hour demand.

This future capacity is considerably higher than light rail can provide — unless the light rail is fully grade separated and automatically controlled like SkyTrain.



A capacity of 28,000 passengers per hour in each direction is expected to be more than adequate to cope with all future growth, including planned extensions to Lougheed Mall and Coquitlam Centre. SkyTrain's capacity could be further extended — up to 30 per cent — by using wider cars, longer station platforms and closer headways. This would involve major capital expenditures and is unlikely to be necessary.



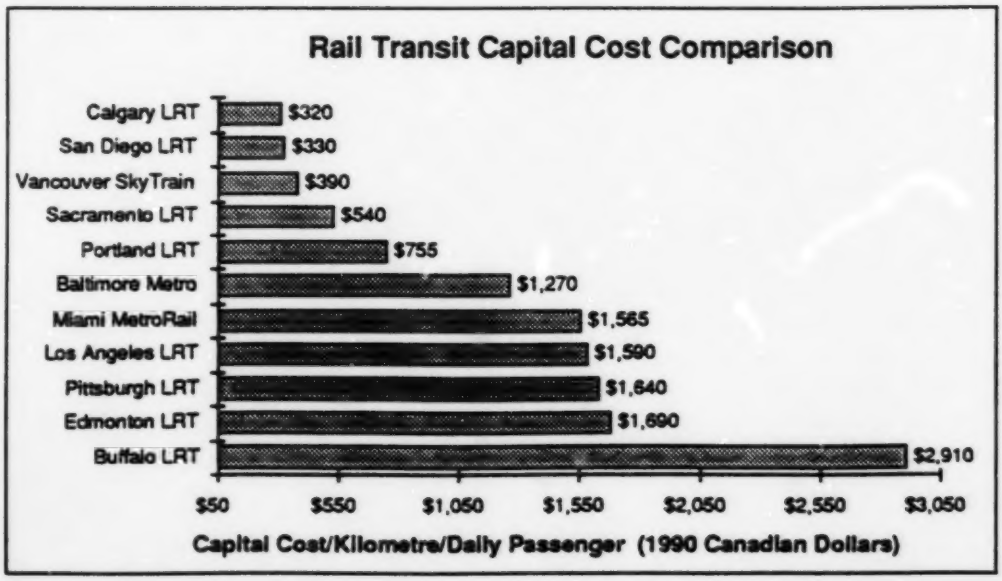
CAPITAL COSTS

SkyTrain Phases One and Two cost more than one billion dollars — $1,050 million for the 24.6 kilometres and 17 stations from Waterfront to Scott Road. This is often compared to Portland's light rail, which cost $345 million (in the same 1989/90 Canadian dollars) for the same distance — 24.0 kilometres.

This is not a fair comparison. SkyTrain was designed to carry 100,000 passengers per day and has exceeded this in recent months. Portland's light rail was built to carry 25,000 passengers per day and is carrying 20,000 per day. Both systems are designed to carry more passengers by adding trains. The cost of a rail transit system is determined by the number of riders.

A more equitable way to compare systems is to calculate the capital cost per kilometre, per daily passenger. The capital cost per kilometre per daily passenger for SkyTrain is $390, whereas for Portland's light rail it is $755. New extensions to both systems will reduce these figures. The Whalley extension will cost $127 million and add approximately 15,000 passengers per day, reducing SkyTrain's cost per kilometre per passenger to $325. Portland's new West Side light rail extension is estimated to cost $920 million (Canadian) and add 30,000 passengers per day. This will reduce Portland's cost per kilometre per daily passenger to $650 — double that of SkyTrain.

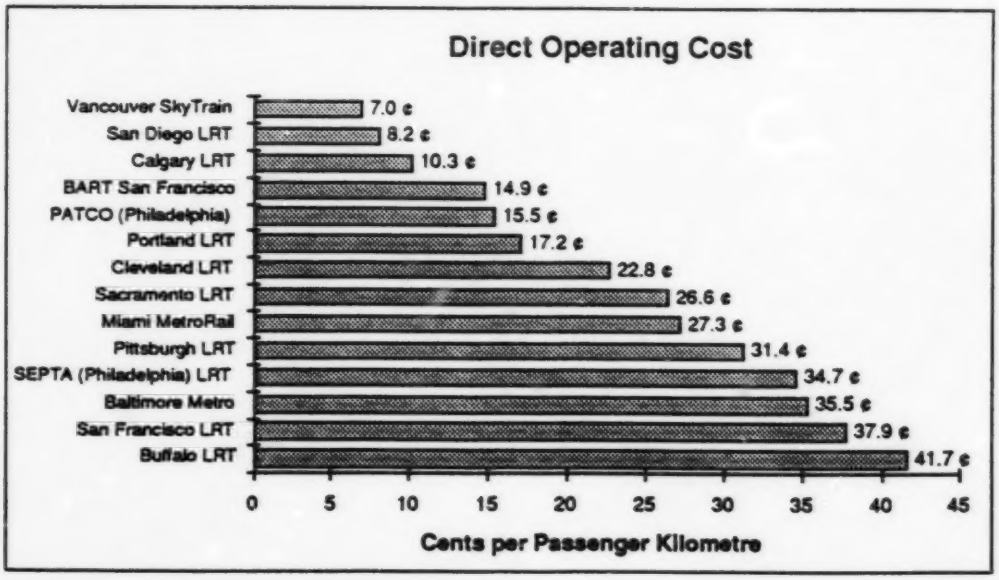
The capital cost per route kilometre per daily passenger is shown below for new North American light rail and rapid transit systems opened in the last 10 years. SkyTrain is the third most capital cost efficient system in this evaluation with costs close to those of Calgary and San Diego.



OPERATING COSTS

SkyTrain's operating cost is one of the lowest in North America. In addition, SkyTrain's automation allows the addition of trains at low cost so that with growth the cost per passenger kilometre will decrease further. SkyTrain also provides roving attendants who provide higher levels of passenger information and assistance than is normal on other light rail or rapid transit systems.

The direct operating cost per passenger kilometre, excluding interest or depreciation, and all other operating data in this fact sheet, are obtained from the *American Public Transit Association 1991 Transit Operating and Financial Statistics* and compared to actual SkyTrain fiscal 1990-91 costs and data. Operating costs include overhead, insurance, security and contracted out services. In the case of SkyTrain, these include vehicle and station cleaning.



SkyTrain's operating cost is less than a third the average cost per passenger kilometre of BC Transit's Vancouver bus system. If all SkyTrain passengers were being carried by bus, it would add $66 million to BC Transit's annual operating costs.

It would not be possible to move 35 million additional passengers per year by bus on this corridor without adding road capacity. To replace SkyTrain at present ridership levels, the corridor would need a six-lane freeway and another major bridge. SkyTrain takes 5,000 cars and their pollution off local streets in a single peak hour. For the future, SkyTrain has the capability to carry four times more passengers than today — equivalent to the number of passengers that could travel on a 24-lane freeway — without the negative environmental impacts.

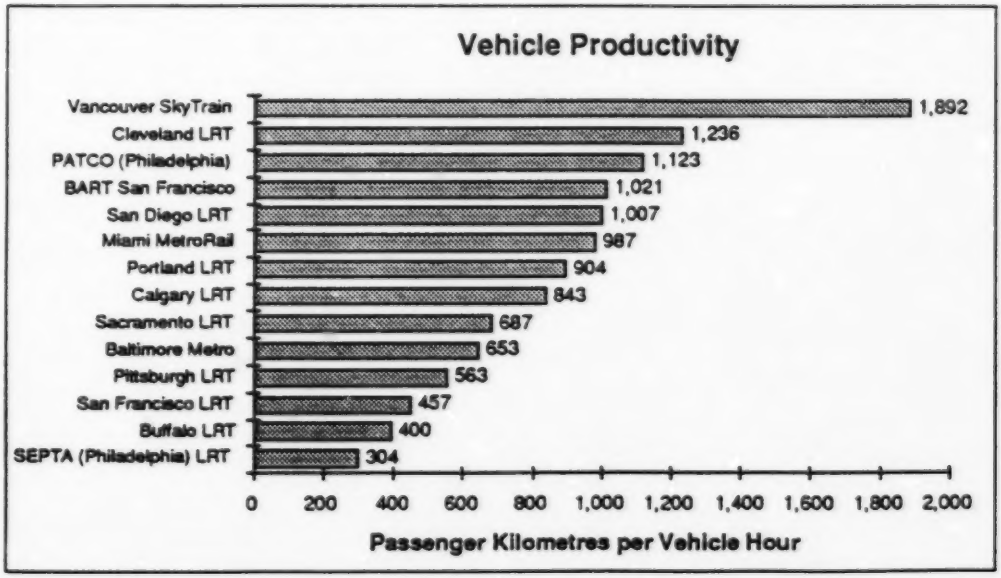
EFFICIENCY

SkyTrain's low operating cost is due to the efficient use of vehicles, staff and energy.

VEHICLE PRODUCTIVITY

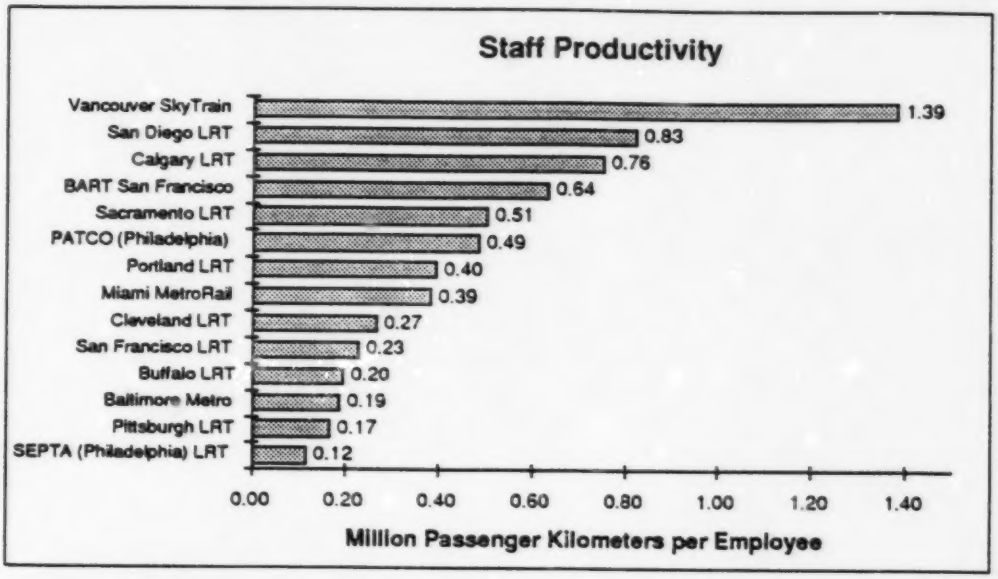
With a schedule speed of 41 km/h from end to end of the line, SkyTrain is fast compared to the average of 26 km/h on seven new light rail systems. SkyTrain vehicle availability is the highest in North America. In 1990, up to 108 of 114 cars were used in the peak period. This 95 per cent availability compares with an average of 76 per cent on 14 other new rail transit systems.

Two SkyTrain cars, called a married pair, have the same capacity as a single articulated light rail vehicle. Combining the high availability with the 60 per cent higher speed results in an equivalent vehicle productivity of 1,900 passenger kilometres per married pair hour, compared to the 795 kilometre average of 14 new rail systems.



STAFF PRODUCTIVITY

SkyTrain staff productivity is exceptional. It is more than double the average of five West Coast light rail systems and three times higher than the average of the 14 rail systems listed. Staff productivity is calculated by dividing the annual passenger-kilometres by the number of employees. Part-time employees are converted into full-time equivalents.

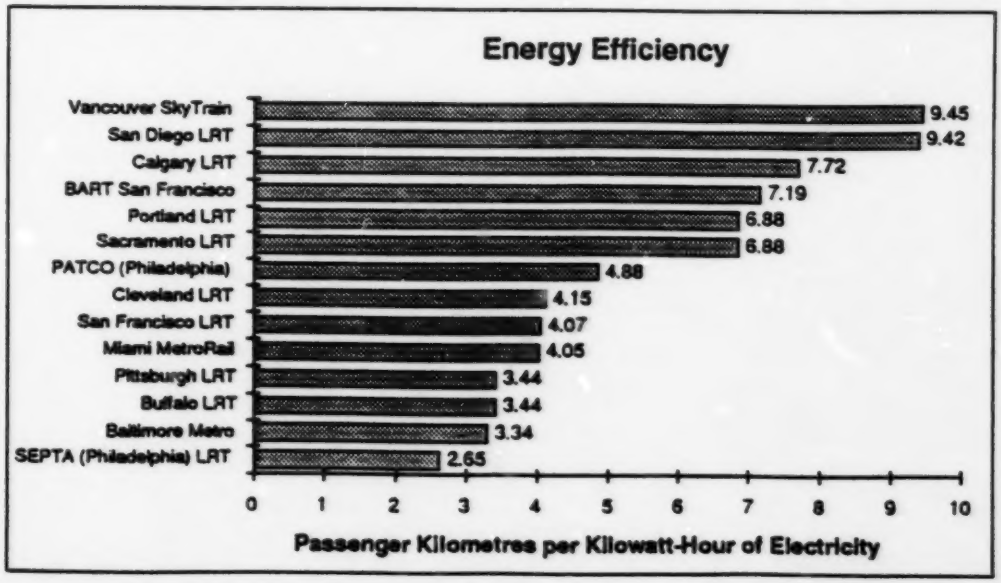


ENERGY EFFICIENCY

SkyTrain shares with San Diego the honors as North America's most energy efficient rail systems. Both use half the energy per passenger-kilometre of the average of the other systems listed.

The criterion for energy efficiency is the number of passenger-kilometres per kilowatt hour of electricity used for propulsion. Energy used includes air conditioning and heating loads.

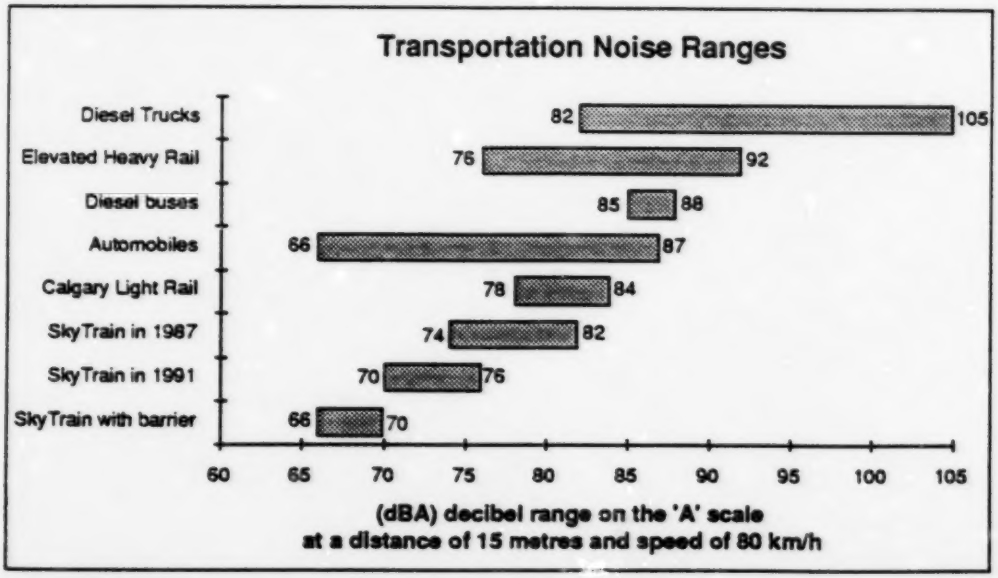
SkyTrain uses one tenth the energy per passenger-kilometre of the average automobile and two fifths the energy per passenger-kilometre of a full size diesel bus.



NOISE

In the first years of operation, high noise levels presented SkyTrain with a major problem. The noise was due to corrugations that developed on the rail running surfaces. BC Transit approved a one million dollar multi-phase noise reduction program in 1989, following a report from the B.C. Ombudsman. Corrective action was completed in 1991 and independent measurements were made by the acoustic consulting firm, Barron, Kennedy, Lyzun & Associates.

Today, SkyTrain is one of the quietest rapid transit or light rail system in North America, with noise levels substantially below those of traffic on arterial roads. SkyTrain maintains these low noise levels by grinding rail and turning wheels periodically. Noise barriers have been installed beside most residential areas on the SkyTrain route.



NOTES: Elevated rail transit noise data is from DAVID A. TOWERS P.E., DR. ROBERT P. KENDIG. *Noise Impact of Elevated Structures in United States.* Urban Rail Transit Systems. American Public Transit Association, Rail Conference, San Francisco 1980. SkyTrain and light rail data from BARRON, KENNEDY, LYZUN & ASSOCIATES *An Investigation of Noise for the Vancouver/Richmond and Coquitlam Extensions... May 1991.* Some rapid transit and light rail systems do not reach 80 km/h, requiring noise readings to be adjusted using industry accepted formula.

Road traffic noise data from J.L. BEATON & L. BOURGET *Can Noise Radiation from Highways be Reduced by Design?* US TRB Highway Research Record, and G.J. THIESSEN & N. OLSON, *Community Noise—Surface Transportation, Acoustical Society of America.*

On the logarithmic decibel scale, each 3 dBA represent a halving of noise levels. 3 dBA less is half the noise level, 6 dBA less is a quarter the noise level. Noise energy is reduced by half as the distance from the train doubles. For example at 30 metres, the single train noise levels will drop 3 dBA from the data on the chart, shown for 15 m. Data are for trains on modern, concrete, elevated guideway. Steel structures tend to be noisier, ground level (at-grade) sections quieter. Higher noise will occur on tight curves. Noise levels vary from train to train and with weather conditions.